# METHODS AND SYSTEMS FOR SAMPLING FREQUENCY OFFSET DETECTION, CORRECTION AND CONTROL FOR MIMO OFDM SYSTEMS

## ABSTRACT

Methods and systems that are capable of detecting and correcting the sampling frequency offset as part of signal synchronization in MIMO OFDM systems. An exemplary MIMO OFDM system includes a transmitter with a number of OFDM modulators that provide data to antennas for transmission across a channel to a receiver. The OFDM modulators include a training symbol inserter that may insert a matrix of pilot tones into the data. The data including the matrix of pilot tones is received by a receiver having a number of OFDM demodulators including a synchronization circuit. The synchronization circuit uses the matrix of pilot tones to detect and correct the sampling frequency offset as part of the signal synchronization. The synchronization circuit may apply an open loop process including sampling frequency offset estimation, phase rotation, and channel estimation. Alternatively, the synchronization circuit may apply a closed loop process including error generation, loop filtering and accumulation as well as sampling frequency offset estimation, phase rotation, and channel estimation.

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